



**UNITED STATES DEPARTMENT OF  
COMMERCE National Oceanic and Atmospheric  
Administration**  
National Marine Fisheries Service  
Southwest Fisheries Science Center 8604  
La Jolla Shores Drive La Jolla, CA 92037

**Sept 7, 2004**

## **DRAFT CRUISE INSTRUCTIONS**

NOAA Ship: NOAA Ship *David Starr Jordan*

Cruise Number: DS-04-08, SWFSC Cruise Number \_\_\_\_\_ (Shark ETP)

Cruise Dates: 11 September - 13 October, 2004

Cruise Title: NOAA Ocean Explorations: Large Pelagic Sharks of the Eastern Tropical Pacific

Study Area: A section of the Eastern Tropical Pacific Ocean (ETP)

### Itinerary:

Ship loading and gear preparation: 09 – 10 SEPT Transit: 11 SEPT- Depart San Diego, CA 17 SEPT-Arrive Acapulco, Mexico Leg 1: 20 SEPT- Depart Acapulco, Mexico 13 OCT- Arrive San Diego, CA

Approximate tracklines are included at the end of this document in Appendix 1. Tracklines and waypoints are being finalized and will be provided shortly. Tentative waypoints are provided in Appendix 2. Once finalized, they will be available electronically, in Nobeltec format, upon request.

Sponsoring Institution: NOAA/NMFS, Southwest Fisheries  
ScienceCenter (SWFSC) Fisheries Resources  
Division (FRD)

### Cruise Description and Objectives:

The objectives of the NOAA Ocean Explorations: Large Pelagic Sharks of the Eastern Tropical Pacific research cruise (LPS-ETP) is to investigate the elasmobranch predators of the ETP, their species composition, life-history, movement patterns, food

habits, physical environment and biotic environment. This will be accomplished primarily by catch-and-release longline sampling. Some animals that are suitable in size and condition will be tagged with Pop-off Archival Tags (PAT tags) and/or Smart Position and Temperature Transmitting tags (SPOT tags) as a means of determining day-night vertical movements and long-term horizontal movement patterns.

**Primary Research Objectives:**

1. Sample and document the diversity and abundance of LPS's in the ETP.
2. Record the daily movements and long-term migratory patterns of LPS's
3. Record dive depths, dive patterns, diel activity, and thermal environments of LPS's
4. Correlate the movement patterns of LPS's with regard to large-scale oceanographic and bathymetric features
5. Develop non-lethal methods of obtaining and archiving DNA, blood, and tissue samples from LPS's

**Secondary Research Objectives:**

1. Determine the trophic reliance of LPS's on marine mammals (lipid signature and stable isotopes)
2. Determine sex and reproductive state (non-invasive techniques based on DNA and blood hormones)
3. Develop a non-lethal molecular genetic system of shipboard identification (multiplex haplotype specific PCR).
4. Collect ichthyoplankton samples (both eggs and larvae) preserved in ethanol to aid in further development of automated DNA-based methods of identification of pelagic fish species.

**PLAN OF OPERATIONS**

**1.0 DAYLIGHT OPERATIONS**

1.1 Longline Survey – Longline surveys will be conducted twice-daily beginning at 0600. Each longline set will be approximately 2 miles in length with hooks placed every 50ft. Soak times will be up to three hours. Circle hooks will be used to minimize lethal hookings. All animals captured will be measured and released. Three crew members will be needed on the back deck to deploy the line: one on the reel and one on the line. Retrieval of the longline requires four scientific crew to debait the hooks, to leader sharks to the back and stow buoys, to handle the shark in the cradle, attach tags, record data, and keep track of tags and samples. Three ship crew will be needed during retrieval: one on the reel, one on the line, and one to operate the cradle lift.

1.1.1 Satellite Tagging Sharks will be leaded to the transom and directed into the shark cradle. Sharks will be lifted from the water, provided with a saltwater irrigation tube to promote respiration and limit stress. The eyes will be covered and one or both the SPOT and PAT tags will be placed on the animal. SPOT tags are placed on the dorsal fin via nylon screws. PAT tags are anchored into the dorsal muscle and attached via the skin. This procedure should take roughly 5 minutes. After tag attachment the hook is removed and the animal is lowered back into the water via the cradle.

1.1.2 Logging of Data- A log of observation conditions, fishing effort, species, and life history information: will be recorded on paper and into a computer hooked up to the ship's GPS (for

course, speed and position information) and SCS (for weather and heading information). Sharks and other elasmobranchs of unusual scientific importance may be sacrificed and preserved for museum curatorial purposes. The great majority of animals will be measured, tagged and released.

1.2 Seabird Survey- Visual surveys of seabirds may be conducted from the flying bridge during daylight hours by two seabird observers. A log of sighting conditions, effort, sightings and other required information will be entered into a computer interfaced with the ship's GPS (for course, speed and position information) and SCS (for weather and heading information). Seabird observers will use both handheld and 25x150 binoculars.

1.3 Small Boat Work - A small boat may be necessary for more directed shark chumming and fishing in order to capture animals of larger size classes. Larger sharks will be targeted for electronic tagging, whereas the longline surveys will be conducted to get species compositions and catch rates for all sharks encountered in a standardized manner. In addition, the small boat may be used for sampling, photography, seabird collection, island surveys or marine turtle work to assess the pelagic ecosystem as it relates the behavior of the LPS's. Deployment will be requested by the Cruise Leader on an opportunistic basis, possibly multiple times in a single day, providing the Commanding Officer concurs that operating conditions are safe. Unless the Commanding Officer allows otherwise, the small boat will remain within sight and radio contact at all times while deployed.

1.4 Collection of Fish - Fish will be collected on an opportunistic basis at the discretion of the Cruise Leader. While underway, trolling gear will be used when conditions permit. While stationary, hook-and-line gear will be used. Fish will be measured, sexed, and stomach contents will be examined and recorded by scientific personnel. The Cruise Leader will be responsible for the disposition of the catch, in accordance with NOAA Administrative Order 202-735B, dated January 9, 1989. All flyingfish specimens that land on the decks will be collected by the scientific party and frozen. We request that any individual who finds a flyingfish on deck please notify the Cruise Leader.

1.5 Buoys - The ship may be required to approach equatorial buoys to repair or maintain scientific instruments for the Tropical Atmosphere Ocean (TAO) project. This will occur on an opportunistic basis at the discretion of the Cruise Leader, providing the Commanding Officer concurs that conditions are safe for such operations.

1.6 Acoustics –The scientific EK-500 depth sounder will be operated, at 38, 120 and 200 KHz and interfaced to a data acquisition system to estimate micronekton biomass between 0 and 500 m. The vessel's EQ-50 depth sounder may be used at the discretion of the Commanding Officer, but will normally remain off while underway. The ship shall inform the Cruise Leader of any use of the vessel's EQ-50, as it interferes with the signals received on the scientific EK-500. Its use will be continuous.

1.6.1 ADCP – The ship's ADCP should run continuously and be logged to a data acquisition system. Complete system settings will be provided by the oceanographer, but will include 5-minute averaging of currents, AGC and 4 beam returns in 60 8-meter bin.

1.7 Oceanography - Oceanographic sampling will be done by the oceanographers and other designated scientists, while underway during the day.

1.7.1 Thermosalinograph Sampling - The ship will provide and maintain a thermosalinograph (TSG), which is calibrated and in working order, for continuous measurement of surface water temperature and salinity. A backup unit (calibrated and in working order) will also be provided by the vessel and remain aboard during the cruise. The Scientific Computing System (SCS) will serve as the main data collection system. The oceanographer will provide the ship's Operations Officer and Electronics Technician with detailed SCS acquisition information before departure and a member of the scientific party sailing on the initial transit will also provide additional technical support. All SCS data will be provided to the SWFSC oceanographer following each leg of the cruise. The Seabird data acquisition computer (that operates the TSG) will also collect the raw TSG concurrently.

## 2.0 NIGHT OPERATIONS

A chronological record of oceanographic and net tow stations will be kept by the ship (Marine Operations Log) with dates and times in GMT. The ship will provide a copy of the electronic marine operations log (with the cruise Weather Log and SCS data) to the SWFSC oceanographer at the completion of the cruise. The collection of oceanographic data, samples and their processing will be conducted by the scientific party. The crew of the vessel will operate all deck equipment and be responsible for the termination (and any necessary reterminations) of the CTD cable pigtail (provided by the scientific party) to the conducting cable of the winch.

2.1 CTD Stations - CTD stations will be occupied on an opportunistic basis to coincide with ichthyoplankton sampling. CTD data and seawater samples will be collected using a self contained unit provided by the scientific party. Additional CTD stations may be requested by the Cruise Leader in areas of special interest.

2.2 Net Sampling -Net tows will be conducted by the scientific party with the assistance of a winch operator from the vessel. The schedule for these tows may vary by leg and may need to be modified by the Cruise Leader.

2.2.1 Dipnetting – (Who's doing all this stuff? Did you commit to the mammal folks?) Concurrent with the evening CTD station, dipnetting for surface fauna will be conducted by scientific personnel, for one full hour, from the starboard side of the ship. One or more deck lights will be necessary to illuminate the water surface in the area of dipnet sampling. Samples will be preserved, labeled and stored in the vessel's freezer. Scientists may also collect surface fauna for aquaria on board.

2.2.2 Ring Net Tow – An oblique 1-m ring net tow (0.505 mm mesh net) will be conducted to a depth of approximately 200 m (wire out = 300 m, deployed at 50 m/min and retrieved at 20 m/min following standard oblique tow protocol). The ring net cast will be made from the starboard hydro winch. Samples will be preserved in 5% sodium borate-buffered formalin, labeled, and stored in containers provided by SWFSC until the vessel returns to San Diego. Estimated time for completion of the cast and sample preservation is 30 minutes. This sampling will be on a time available basis.

2.2.3 – Bongo Net Tow – An oblique bongo net tow will be conducted after the ring net tow. The bongo will be equipped with a 0.505 mm mesh net on the starboard side and a 0.333 mm mesh net on the port side. The cast will be made from the starboard hydro winch to a depth of approximately 200 m (wire out = 300 m, deployed at 50 m/min and retrieved at 20 m/min following standard oblique tow protocol). Samples from both nets will be preserved, labeled, and stored in containers provided by SWFSC until the vessel returns to San Diego. The sample from

the starboard net (0.505 mm mesh) will be preserved in 5% sodium borate-buffered formalin; the sample from the port net (0.333 mm mesh) will be preserved in 95% ethanol. The ethanol must be changed approximately 24 hours after initial preservation. Following this bongo cast, a second oblique bongo tow will be made to a depth of approximately 200m following the standard oblique tow protocol. The sample from the port net (0.333 mm mesh) will be frozen following the STARLET cruise protocol. A sample is not scheduled to be collected in the starboard net on this second cast, but one may be collected if desired by scientific personnel. Estimated time for completion of both bongo casts and sample preservation is one hour.

2.3 Transit - When scientific operations are complete for the night, the ship will resume course along the trackline at a speed determined by the Cruise Leader, until it is necessary to stop for the morning longline station.

#### 4.0 EQUIPMENT

##### 4.1 Supplied by scientific party:

1. Video camera and tapes
2. One Digital SLR camera, and two 35mm cameras with lenses and 35mm film
3. Two to three laptop computers for scientific party use
4. sample vials and storage solution (EtOH) with MSDS
5. -80 freezer
6. Two long-handled dipnets and sample containers
7. 2 gimbaled 20 gal aquarium tanks (for inside use)
8. 2 50-gallon aquarium tanks (for outside use)
9. Formalin and sodium borate
10. 1-m ring net with towing bridle, net (and spares) and glass sample containers
11. Bongo nets (including spare) and frame and glass sample containers
12. Safety (MSDS's) and clean up materials for all chemicals
13. Permits for specimen collection and foreign research
14. buckets of leaders
15. 40 buoys with a basket of leaders
16. Float with radar reflector
17. Sea anchor
18. Gloves, boots and kneepads
19. Extra leaders (spool), hooks, extra longline cable (spool), cutters and crimpers
20. Tagging kits (conventional, electronic tags, inserters, and data sheets)
21. coolers
22. Sample kits with vials for tissue and blood samples

4.2 Supplied by ship -We request the following systems and their associated support services, sufficient consumables, back-up units, and on-site spares. All measurement instruments are assumed to have current calibrations and we request that all pertinent calibration information be included in the data package.

1. Small boat for sampling, photography, seabird collection
2. Deck lighting for dipnetting
3. Freezer space for water (15 cu. ft.) and biological samples (-70° freezer and walk-in)
4. Hydrographic winch with minimum 400m cable (1/4" to 3/8" dia.) for net tows
5. Bottom depth checking during CTD casts and net tows in depths less than 2000m.
6. Oceanographic winch with 5/16" conducting wire

- ~~7.~~ SeaBird thermosalinograph (SBE21) and connection and backup unit
- 8. Scientific Computing System for data collection
- 9. Simrad EQ50 echo sounder and input cables in SIC room
- 10. Simrad EK500 scientific sounder and data logging system with 38, 120 and 200 KHz transducers
- ~~11.~~ Constant temperature room (20-22°C)
- 12. Deck space for 2 manta frames (one spare), two bongo net frames (one spare)
- 13. RDI 150-kHz ADCP and data acquisition system.
- ~~14.~~ Marine Operations and Deck Log (electronic)/Weather Observation sheets, filled out by Deck Officers
- 15. Copy Machine
- 16. Additional email computer for scientific email use in dry Lab
- 17. Longline spool and associated tackle
- 18. Shark cradle and associated tackle (suspended from the rear A-frame)
- 19. Freezer space to hold roughly 60 boxes of bait and chum
- 20. Free space on back deck to stow leaders and buoys, and starboard rear area kept clear for the longline
- 21. Bench area for leader and hook repair and electronic tag preparation
- 22. Mounting space on starboard aft quarter rail for Underway CTD (approx. 3 linear feet)

4.3 Installation and Maintenance - Prior to departure from San Diego the Chief Scientist and members of the scientific party may board the vessel, with permission of the Commanding Officer, to test survey equipment and environmental sensors, set up equipment and assemble and modify wooden decking on flying bridge.

During the cruise, the temperature of the freezer and the refrigerator must be monitored by the ship's engineering staff twice daily, and the Cruise Leader notified in the event of significant changes.